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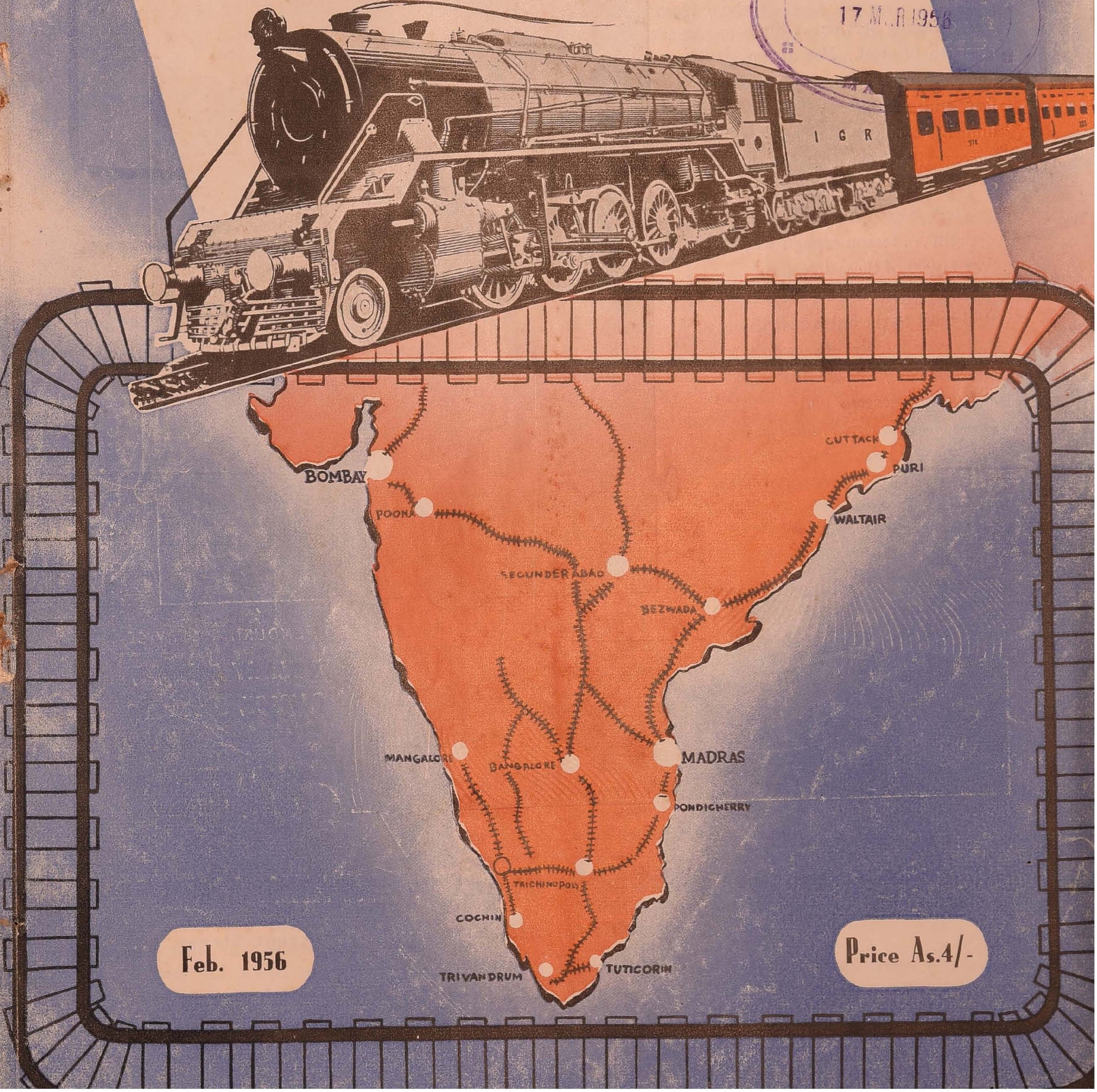

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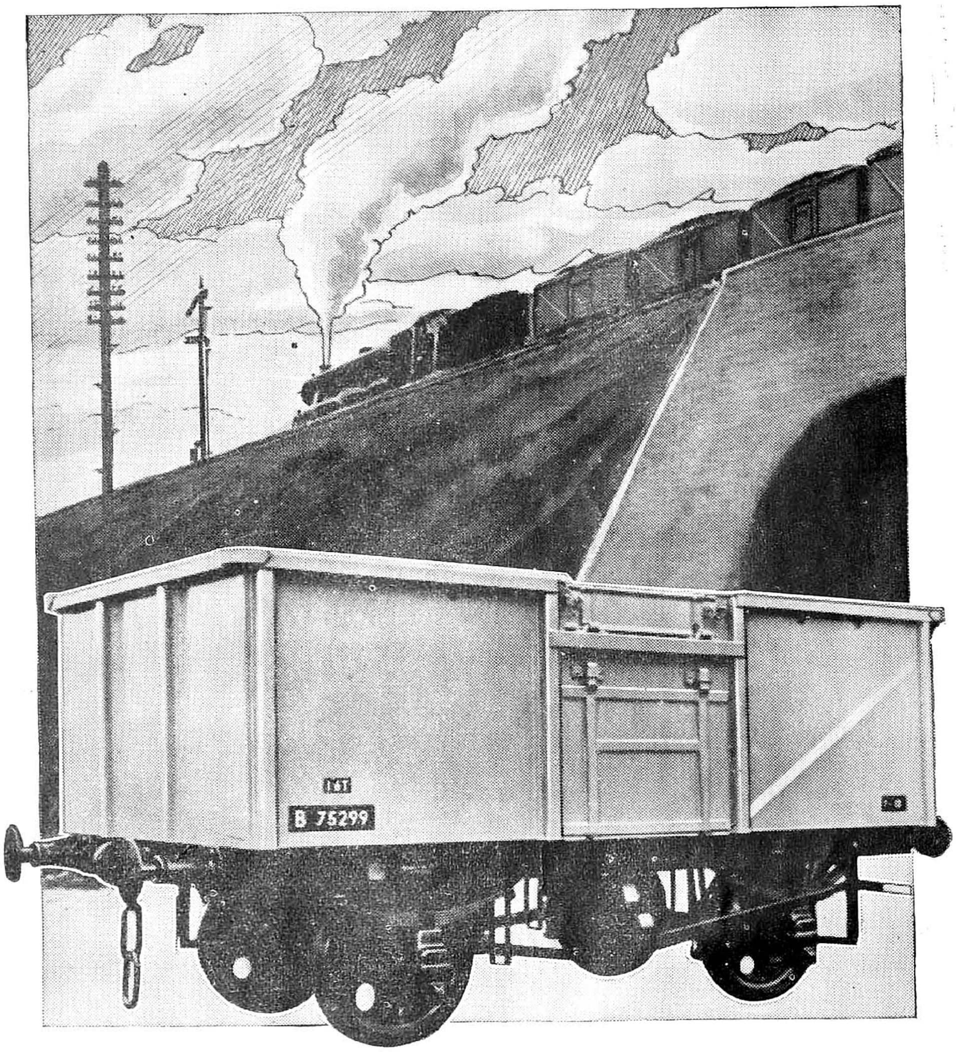

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Planned Maintenance of Machinery & Plant in Railway Workshops

By C. H. De Sousa, *M. I. Mech. E. M. Amer. S. M. E.*
Consulting Engineer (Ex-Dy. C.M.E. Central Railway)

THIS is an era of planning and for working to a plan. Hence we have the 5-Years Plan, planning for production, planning for the family and many other types of planning, which make for a higher degree of efficiency if rigidly adhered to.

It is, therefore, to be expected that if the maintenance of Plant & Machinery in Railway Workshops is planned, a higher degree of machine usage can be assured, resulting in greater production and, therefore higher efficiency.

It is naturally the aim of all Managements to get the maximum out-turn, whether it be in the repair of locomotives, carriages, wagons, the production of spare parts for these, or the building of new stock from the minimum number of machines and plant. This can only be achieved if the maximum number of machines are kept in working order and any stoppages from whatever cause are kept as low as possible.

To keep machines and plant at work continuously is no easy task and, therefore, much care and forethought is required in maintenance. Plans must be drawn up and put into effect which will reduce breakdowns to negligible proportions and even reduce minor stoppages to a considerable extent so that the available machine hours graph does not fluctuate too much.

To accomplish this aim, four types of maintenance steps are required as follows :-

1. Weekly Inspection,
2. Quarterly Repairs,
3. Annual Overhaul,
4. Reconditioning.

WEEKLY INSPECTION

As all shops close down for one day in the week it is a simple matter to allocate this day for machine inspection by the maintenance staff, and give them a day off some other day in the week.

If machines are kept clean regularly by the operators themselves—and most shops allot a weekly hour for wiping down and lubrication—the operators would be in a position to guide the maintenance staff to inspect any particular defect which they themselves notice. The maintenance man while looking at most machines under his charge in rotation, according to their age and condition, would advisedly take a better look at the machines complained off and try to arrive at the cause of the defects. He would either repair the defect immediately if it is small or take the necessary precautions to see that it does not grow worse. He would in his own interest and in the interest of the shop concerned nurse the defect week after week until he can give it proper attention at the quarterly repairs shut down. In the meantime he would see that the necessary spares are available to attend to the machine when that time comes.

At this inspection, not only are the machines inspected but also all ancillaries, such as belting, chain drives, fast and loose pulleys, countershafts, pulley levers and motors etc. Cleaning where necessary and lubrication is also effected. It is necessary to make an honest record of the machines inspected and the defects noticed, in a register opened for the purpose.

Much of the present day trouble, often resulting in a major breakdown is the result of careless or haphazard inspection, or perhaps no inspection at all, but a dishonest entry in the record book, that an inspection has been carried out and no defect noticed.

Although the Millwright or maintenance staff are not necessarily skilled machine operators yet their long association with machinery gives them sufficient experience to operate all types of machines, sufficiently well to notice defective working.

QUARTERLY REPAIRS

Before a machine can be taken in hand for its quarterly repairs, it is necessary to warn the foreman of the operating shop that such and such a machine will be taken in hand for quarterly repairs. It is necessary to give this notice at least a fortnight in advance so that arrangements may be made to transfer the work on to another machine of its type or to hold up the work until the machine is attended to and put back to work.

In this case it is the maintenance foreman who has the advantage over the operating foreman and if the system of maintenance is to work correctly, no excuse to keep

the machine at work in spite of timely advice should be tolerated. It would, of course, be infinitely preferable if the two foremen could mutually adjust their requirements and meet each other half way without allowing the machines to suffer.

Once the machine is handed over to the charge of the maintenance department, the handing over note should also indicate the defect experienced, if any. This together with the maintenance man's own notes on the subject will enable him to assess how it would take to give the machine the attention it requires and return it to service. The nature of the repairs effected must be such that the machine is capable of lasting till the next quarterly attention period with weekly inspection thrown in.

It is only on opening out the machines that the seriousness of the defects can be estimated in man hours of labour, assuming of course that the spare parts have been ordered well in advance and are now available. It is usually the Clutches and the Gears, the Slides and the Bearings that demand first attention. If these are alright not much attention will be involved in this quarterly repair unless, of course, some major defect is apparent.

Again, a proper and an honest record must be maintained of the defects noticed and the work done. The supervisor's initials should also be taken on the record so that he cannot say at a later date, if a breakdown occurs that he was not aware of the defects and the attention given to put them right.

All bolts and nuts should be properly tightened, lubrication supplied and the operating foreman should be apprised that the machine is ready for handing over, should he desire to witness the trial. Most foreman, however, leave the job of acceptance to the operator and if he is satisfied, they are prepared to sign blindly the acceptance voucher.

ANNUAL OVERHAUL

The annual overhaul of a machine is a big event in its history. The machine is stripped as far as is necessary and each detail gets a minute and thorough inspection. If spare parts from makers or from shop manufactured stock are readily available, these are utilized and the old parts if salvageable are put away for attention. Recourse is had where required for welding 'In Situ', machining, hardening, grinding, in position or out of it. Welded parts which can be normalised are sent to the furnace while other parts are annealed by the flame process to prevent brittleness. Every part where wear and tear has taken place gets adequate attention and in a sufficient measure to enable it to last till the next overhaul. Each type of machines gets that degree of attention which is commensurate with its light or heavy usage.

Where the quarterly repairs may take anything from 1 to 5 days in a well regulated maintenance shop an adequate annual overhaul may take anything from 8 to 20 days or more depending on the nature of the work.

MACHINE INDICATION BOARDS

It is a good practice when a machine or plant is out of commission for any reason whatsoever, to have a medium size board attached to it in a prominent place so that both the repairers as well as the users can see it. The information on the board should have the following :—

1. Why the machine has been stopped.
2. The date and time when it was stopped.
3. The date and time when it was taken in hand for attention.
4. The estimated date and time by which it is expected to be completed and put into commission.
5. The cumulative hours that the machine has been put off use.

This type of board keeps everyone on his toes as most Engineers have a very good idea of approximately how long a particular type of defect should take to put right. It also gives the operating foreman of the shop an idea when he can expect the machine for work. At the same time it gives the Managers going their rounds during the day and in particular the Production Engineer sufficient information to see that no time is being lost in repairs due to slackness on the part of the maintenance staff.

MASTER REPAIR BOARD

The Master Repair Board is kept in the enclosure occupied by the Millwright or Maintenance Foreman. It should contain the following information :—

1. Number of the machine under repairs.
2. The shop to which it belongs.
3. The date it was stopped.
4. The date it was taken in hand for repairs or overhaul.
5. The nature of the repairs to be effected.

6. The approximate date by which the machine is expected to be repaired and handed over.

7. The orders placed on other shops, such as foundry, blacksmithy machine shop or stores department and their position.

There should be a machine repair chaser doing nothing else but seeing that the parts required are obtained at the earliest time and if there is likely to be an inordinate delay for any reason he should give his foreman timely warning so tha the can take adequate steps to expedite the manufacture or purchase of the part in demand.

The Master Repair Board which can be drawn up shop-wise should also have the total number of machines in each shop, so that a percentage of machines out of commission can be clearly indicated.

MASTER REPAIR RECORD CARDS

Every time a machine is out of commission, there should be a procedure by which this is reported to the Plant Office. Steriotyped forms drawn up for the purpose could be used.

Each machine in the Works should have its separate record card in which every stoppage of the machine is recorded with the reason for stoppage, the time in hours the repairs took etc. All information except the weekly check up concerning each machine should be available for inspection by the officer in charge, usually the Senior Assistant Works Manager, who has the Millwright under his control.

This record is very useful in assessing the quality of the machine, its weakness, its out of service period per year or a number of years etc. The history cards of machines serve many useful purposes and the most important among them is that they indicate whether the machine due to either age or condition is required to be replaced and whether the replacement should be by a similar machine or one which is superior both in construction and production.

The trouble with most Railways where such history cards exist is that they are not kept up-to-date for some reason or other with the result that all the valuable data and information after being carefully collected is vitiated due to negligence.

RECONDITIONING

Reconditioning means the bringing back the machine selected to its original condition or as near as possible to it. It is a long drawn out process where certain selected machines because of their extreme utility or productivity are taken in hand in this type of overhaul. Accuracy is the keynote of reconditioning and therefore the process cannot or should not be hurried.

The machine is stripped and built up bit by bit from the base upwards and every step must be checked for accuracy before the next step is superimposed on it. If this is not done, then when it comes to the final stage and inaccuracy is discovered the machine will have to be taken apart and re-checked until the defect is discovered.

When the machine is finally ready it should be made to pass the Schlesinger Tests, and these are usually carried out personally by the Production Engineer. Only when he is satisfied with the accuracy of the machine to the Schlesinger tolerancer does he give a certificate which permits the machine being put back into service. There are Schlesinger Tests for every type of machine and to bring each to this standard may take a period of about 3 months per machine. Depending upon the number of staff available 3 or more machines can be taken in hand at a time for rehabilitation. A rehabilitated machine should give useful and accurate service for 8 to 10 years.

BREAKDOWNS

In the best regulated workshop, in spite of planned maintenance, breakdowns cannot be avoided but it should be the aim of the management to see that they occur very seldom indeed. The causes of breakdown are gross carelessness, deliberate sabotage, or mishandling by inexperienced staff etc. All these causes should be carefully analysed and the party at fault should be severely dealt with.

Sometimes a machine costing many thousands of rupees can and may be ruined by an inexperienced operator as happened in many Railway Shops during the last war. The need of production and more production, to meet military demands was so urgent that only partially trained men had to be entrusted with valuable machines, which they sometimes ruined

and put out of action for long periods. The dismisal of the employee was a poor compensation for the damage he had done.

Working of machines on double and in some cases treble shifts without stoppage or sufficient rest is another cause of a sudden breakdown. Machines although they are inanimate things, appear to respond in service to those who treat them with consideration and attend to minor faults or defects in time to prevent major ones occurring. It should, therefore, be the pride of an operator that in spite of heavy usage his machine is in good fettle.

SPARE PARTS

Anticipation in repairs is an important function of the maintenance staff and can save much time and money. Bearings and Bushes and similar parts should always be stocked in the rough state so that when the need arises, they can be finished to size and thereby save time.

PLANT AND EQUIPMENT

Most Railway Workshops are provided with hydraulic and Pneumatic Plant, and it is necessary that it should be kept in good state of repairs in order that it may serve its purpose economically.

For hydraulic plant, the principal defects stem from leaky leather buckets. Leather perishes very easily when not in use, and loses its pliability thereby causing leaks. Pipe joints too because of the high pressure maintained are likely to give way and as for their longer lengths they rest in underground troughs, leaks are not always visible.

What applies to hydraulic plant applies with greater force to pneumatic plant. Workers hardly ever realise that a continuous leak from a 1/4" diameter opening may result in a wasted expenditure of over Rs. 1,000/- per month. Leaky Valves and leaky joints should receive constant attention and immediate repairs.

Periodical tests may also be laid down for these two varieties of plants. At a time when the shops are not drawing off the power, the pipe liner should be brought to working pressure, and by means of gauges a check should be made to see in what length of time the pressure keeps on falling. The rate of fall will indicate whether the leak is heavy or light and then prompt attention should be given.

OVERHEAD ELECTRIC CRANES

It is essential that these must be kept in working order continuously, because a Crane breakdown may paralyse a whole shop and have its repercussions on other parts of the works, resulting in heavy loss of outturn and finance. Millwrights realise this and there are seldom heavy breakdowns in Cranes which are not given priority in repairs. Here again, an anticipation and stocking of certain important spares in the trough will save hours of closure and should not be lost sight of.

ELECTRIC MOTOR

It is necessary during shut downs that the electricians give the necessary attention to electric motors and switch-gear. As all motors work in the dusty atmosphere of a workshop, it should be regular practice to blow them through with Compressed air, check them periodically for insulation and remove them for repairs and overhaul coincident with repairs and overhaul to machines. Carbon brushes, commutators, slip rings etc. should receive regular inspection and prompt attention.

STAFF

Maintenance staff can be allotted on the volume of work offering in each shop for servicing and repairs. It is very important that they should be kept in each shop or shops as long as possible, so that by association with each machine they come to know their weakness and tendency to defective working. For instance, maintenance men in the Smithy get accustomed to the repairs of heavy forging machines, electro-pneumatic hammers, hydraulic presses and such like. Such staff would be absolutely at sea if switched on to the repair and maintenance of high precision machines such as are found in a Tool Rooms and vice versa.

CONCLUSION

The machinery plant and equipment of a Railway represent a very large part of its capital investment and on the high or low standard of its maintenance will depend the return that will be obtained from it. It should, therefore, be the aim of all concerned to see that nothing but the best is acceptable so far as maintenance goes.

Railways in the First Plan—A Record of Achievement

REVIEW BY SHRI G. PANDE, CHAIRMAN, RAILWAY BOARD

SINCE the last war, the demand on account of both goods and passenger traffic has generally been much in excess of what the Railways have been able to satisfactorily meet.

It was against this background of excess of demand over supply of transport that the Indian Railways commenced their First Five Year Plan.

MULTIPLICITY OF PROBLEMS

They faced a multiplicity of problems. The previous 10 or 12 years had been years of extraordinary stress and strain during which the system had been over worked to breaking point. A sizeable portion of rolling stock and other assets had been withdrawn from service and sent overseas to theatres of war, replacements of worn-out stock had been difficult for almost a quarter of a century due to a variety of reasons. The strain of Partition made the already bad situation much worse.

The condition of rolling stock may help to pin-point the plight of the Railways when the Plan went into operation.

On March 31, 1951, 27 out of every 100 wagons, 30 out of every 100 locomotives and 36 out of every 100 passenger coaches on the line were "over-age" and should ordinarily have been consigned to the scrap heap. Yet, they have had to be retained in active service until replacements arrive.

Necessarily, therefore, the First Five Year Plan of the Railways has been a plan of rehabilitation.

What have the Railways achieved during the First Plan period? The answer may be divided under several heads.

MANY NEW WORKS

The total money allocated to the Railways during the plan period will not only be fully spent, but it is likely to be exceeded. Thus, as against an allotment of Rs. 400 crores, the estimated expenditure is likely to be Rs. 418 crores.

Several new major works have been undertaken during the plan period. The largest of these are the Ganga Bridge Project, the Rail-cum-Road project in Bihar, which when completed in 1959-60 will solve the transhipment problems of East Utter Pradesh, Bihar and North East India.

The Integral Coach Factory went into production on October 2, 1955 marking a major step towards making the Indian Railways self-sufficient in passenger coaches. The factory is expected to reach a peak production of 350 coaches per year during 1959–60.

A LOCOMOTIVE A DAY

The Chittaranjan Locomotive Works, the construction of which started prior to the commencement of the Plan, has already turned about 320 locomotives, well beyond the target, and a decision has been taken to raise its production within 3 years to 300 locomotives per year. When this target is achieved, Chittaranjan will be turning out an average of one complete locomotive every day.

Electrification of the Howrah-Burdwan and Tarakeshwar Branch line on the Eastern Railway is another major scheme which has been taken in hand during the plan period. This scheme is estimated to cost Rs. 11.84 crores.

During the plan period, 12 new railway lines covering about 352 miles have been completed and opened to traffic. 11 lines covering 351 miles dismantled during the war have been restored to traffic. 2 narrow gauge lines covering 46 miles have been converted into metre gauge. Also, 8 more lines covering 484 miles are at present under construction or restoration. These include the 187-mile Khandwa-Hingoli line, the largest single line Construction project to be undertaken since Independence.

INCREASING PRESSURE OF TRANSPORT

What has been the operating performance of the Railways during the Plan period?

During 1950-51, the year immediately preceeding the commencement of the Plan, the Indian Railways loaded 91. 4 million tons of goods. Since then there has been a steady increase in loading year after year—a manifestation of the rising tempo of the country's economic life and the steadily increasing pace of production under the impact of the Plan. During 1955-56, Indian Railways are expected to deal with 115 million tons of goods.

WAGON AND ENGINE USAGE

Against the net ton miles per wagon day index of 351 during 1938-39 on the Broad Gauge, the figure touched the war-time peak of 451 in 1942-43, dropped to the pre-war level of 351 during 1947-48 but has since risen steadily to 485 during 1954-55. This marks a 38 per cent increase over 1938-39 as well as 1947-48, and an improvement of 34 points over the best performance during the war. Similarly on the Metre Gauge during the Second Five Year Plan year 1952-53, the net ton miles per wagon day index stood at 204 which compared with the highest war-time figure of 201 and the 1938-39 figure of 147 recording an improvement of nearly 39 per cent over the pre-war figure. The figure during 1954-55 stood at 194 showing a slight fall as compared to 1952-53 due to heavy floods which seriously dislocated traffic on the North Eastern Railway. Even this lower figure showed a 32 per cent improvement over 1938-39 figure.

REMARKABLE RECOVERY

The remarkable recovery made by the Railways during the post-independence period is also reflected in the comparative index of engine usage. The index of net ton miles per day per engine in use during 1954-55 touched the highest point since 1938-39 both over the Broad Gauge and Metre Gauge systems.

On the Broad Gauge from the lowest figure of 23,044 reached in 1947-48 it went up in 1954-55 to 29,345—an improvement of nearly 27 per cent. The highest war-time figure was 26,960 in 1941-42.

Similarly on the Metre Gauge system an improvement of nearly 26 per cent has been recorded over 1948-49 "low figure". The. relevant figures are 12,382 in 1941-42 (war-time highest) 10,212 in 1948-49 and 12,858 in 1954-55.

TOWARDS SELF-SUFFICIENCY

Three important Committees were appointed last year to go into certain aspects of Railway working.

The first is the Railway Equipment Committee, which has been set-up to recommend measure for making the country self-sufficient in regard to Railway requirements of stores to the largest extent possible. The committee has been doing useful work and we are awaiting its report.

Last year we set-up the Railway Freight Structure Enquiry Committee which has been charged with the task of recommending a freight policy which is in the best interests of the country's developmental economy and at the same time maintaining the Railways financial stability.

Another Committee has been set-up to recommend measures in eliminating the present excessive overcrowding in suburban trains. This committee's report is expected shortly.

TIMELY WARNING

The Indian Railways complete the First Five Year Plan with the sense of solid achievement in many directions.

There has been marked progress towards self-sufficiency of which Chittaranjan and the Integral Coach Factory are the two shining examples.

No effort has been spared to provide more and more transport for the country's rising production. If the demand still outpaces the supply of transport, it constitutes a timely warning to all concerned that during the Second Plan, a plan of large scale industrialisation, extraordinary precautions will be necessary to ensure that the ship of planning does not founder on the rock of inadequate rail transport.

Unless the transport facilities on the Railways are considerably expanded during the Second Plan period, it is obvious that the present unsatisfactory situation will continue. This expansion must naturally be commensurate with the new burdens. It is needless to say that transport should always keep in set with, if not one step ahead of increased production.

HANDING OVER CEREMONY OF U.S. LOCOMOTIVES AT BOMBAY CENTRAL

Mr. Sherman Cooper, United States Ambassador in India, presented the first 4 Broad Gauge locomotives

out of a lot of 100 locomotives being made available to India by America at Bombay Central on 3rd January, 1956. The presentation ceremony was held on Platform No. 5, which had been tastefully decorated for the occasion. There was a distinguished gathering present to witness the ceremony.

The locomotives that were presented were built by the Baldwin-Lime-Hamilton Corporation with which a contract for the manufacture of 50 of the 100 locomotives had been entered into. Under the Indo-American Technical Co-operation Programme, India is to obtain 100 locomotives and 8,700 wagons.

Shri O. V. Alagesan, Deputy Minister for Railways, welcoming the U. S. Ambassador, stated that it was a very kind gesture on the part of the United States Government at this juncture to present locomotives and wagons to Indian Railways which were in urgent need of them. The Deputy Minister referred to the successful completion of the First Five Year Plan Programme and added " We are on the eve of launching a much more ambitious Second Plan; we are trying to bend every nerve and help ourselves in providing adequate rail transport for the growing demands of agriculture and industry. This assistance from the United States of America both in the form of material equipment and technical aid comes at a very opportune moment, and is highly welcome. We feel highly encouraged in our efforts to increase production and to improve the standards of living in our country when we know that a great country like the U. S. A. is taking a sympathetic interest in our venture ".

Shri Alagesan referred to the Indian Railways' achievement in building locomotives and wagons in the country. The Chittaranjan Factory had produced at the rate of 11 Broad Gauge locomotives per month and the TELCO had reached the target of 50 Metre Gauge locomotives a year. The plan was to increase the targets at Chittaranjan and TELCO to 300 and 100 locomotives respectively. Similarly, with regard to wagon manufacture, the capacity in the private sector, which was not more than 8,000 wagons a year, was sought to be increased to not less than 25,000 wagons a year. For the next five years, to cope up with the large scale movement of agricultural produce and industrial output, as well as supplies and equipment for our various development projects like iron and steel etc., extra locomotives and wagons would be required. It is in this context the offer from the U. S. A. to provide the Indian Railways the 100 locomotives and 8,700 wagons was to be viewed.

The United States Ambassador presenting the locomotives on behalf of the Government stated that this aid was an expression of the goodwill that the people of the United States held for the people of India in their great task of building the country.

Referring to the Indian Railways, the U. S. Ambassador said that India had one of the great Railway systems in the world. Its 34,000 miles of track were approximately equivalent in size to such systems as that of Germany, and about 4/5th the size of that of Canada. Although the United States rail-road system of 2,22,000 miles was almost seven times that of India, Indian Railways carried more passengers than the total of all United States rail-roads. On the other hand, due to their expanded economic and industrial development freight carried in the United States was much larger. It was inevitable that India's expanding economic and rural development would exert a continuing and increasing burden both in terms of freight and passenger carriages of India's Railways. The success of India's broad economic programme depended in a large measure on the parallel development of its Railway system. It was a tribute to the foresight of India's Leaders, the Minister for Transport and the Railway Board, for recognising the importance of an improved Railway system in the expanding economy of India. The people of the United State had supported India's objective in the transportation sector of its First Five Year Plan. Though all the locomotives and freight wagons provided to India under the Programme were not manufactured in the United States, the bulk of the quantities were being fabricated in the U. S. shops.

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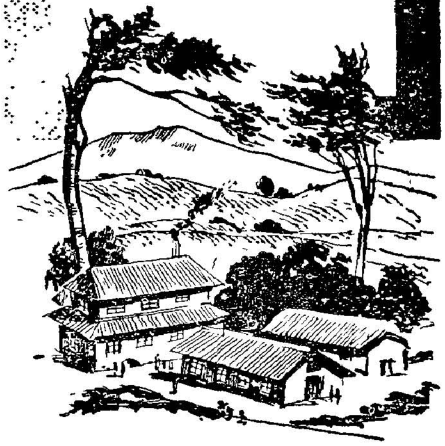

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Inauguration of Gop-Katkola Rail Line in Saurashtra

THE new rail link between Gop and Katkola was opened for Goods Traffic by Shri Rasiklal Parikh, Chief Minister of Saurashtra on 16th December 1955 at a function held at Katkola station.

Constructed at an estimated cost of Rs. 40/- lakhs, the new link is the second major construction in the Saurashtra Region since the integration of the Railways in Saurashtra with the Western Railway, the first being the Re-alignment near Rajkot, which was completed in July 1954. The construction of Gop-Katkola line was commenced in the middle of 1954 and has been completed in a period of less than 18 months.

Of considerable benefit to industries and people in Saurashtra, the Gop-Katkola line will provide through communication for the raw materials in the south of the State to the industrial centres in the north. At present raw materials like lime-stone required by factories in the Jamnagar-Okha area have to be moved *via* Rajkot Junction, which is a very much longer route. With the opening of the new Railway link, these materials will be moved by a very much shorter route (150 miles less), resulting in the reduction in the transport cost to the industries.

With the rapid development of industries in Saurashtra, the demand for rail transport is increasing day by day and the line capacity on certain sections like Surendranagar–Rajkot, Rajkot-Jamnagar and Jamnagar-Okha has reached a saturation point. The new Gop-Katkola line by providing a direct route for lime-stone and other traffic on Porbandar-Jetalsar section to Jamnagar-Okha area, will offer welcome relief to Rajkot-Jamnagar and Jamnagar-Okha sections where the demand for rail transport is very heavy.

The opening ceremony was attended by a large number of distinguished guests from Rajkot, Porbandar and Katkola.

Shri M. Ganapathi, General Manager, Western Railway, welcoming the Chief Minister and other guests, traced the history of the line and stated that the Gop-Katkola link fulfilled a much needed connection between Jetalsar-Porbandar and Jamnagar-Okha sections. He expressed his gratitude to the Saurashtra Government for rendering all assistance required for the acquisition of the land, as well as, in all other matters connected with the construction work. He assured the Saurashtra Government that the Western Railway would do everything possible to improve the means of transport in Saurashtra, consistent with the availability of rolling stock and materials like rails, sleepers etc. which continue to be in short supply in the country. He referred to the large number of works that had been undertaken in Saurashtra to meet the transport capacity in the region.

Speaking on the occasion, Shri Rasiklal Parikh, Chief Minister, Saurashtra stated that the Gop-Katkola link fulfilled the long felt need of Saurashtra. The Chief Minister stated that the transport requirements of Saurashtra were increasing and the most important problem the Railway authorities had to solve was to increase the transport capacity of the existing Railway system in the State. The Saurashtra State had asked for two or three broad gauge links, and according to the Chief Minister, if these were not sanctioned within the next few years, the industrial and agricultural development of the State would be greatly hampered. Shri Rasiklal Parikh congratulated the Western Railway on the expeditious construction of the Gop-Katkola line, which would increase the transport capacity on the Saurashtra Region and bring prosperity to the area.

* * *

REMODELLING OF CHURCHGATE STATION

Shri M. Ganapathi, General Manager of Western Railway held a press Conference on 23rd December, 1955 in connection with the remodelling of Churchgate station.

The present overcrowding on the suburban section during the peak period can be reduced only by increasing the frequency of trains. Apart from the procurement of more electrical coaches to run additional trains, it is also necessary to provide extra terminal facilities at Churchgate station, which has only two lines for the reception and despatch of trains.

The proposed scheme for the remodelling of Churchgate station envisages the provision of one additional line for the reception and despatch of trains and two extra stabling lines to enable rakes to be worked into and outside Churchgate station at frequent intervals during the peak period.

The remodelling of Churchgate station to provide additional lines will be taken advantage of to provide amenities to the passengers which are now lacking. At present the concourse is very small and this limited circulating area gets very crowded during the busy periods. The platforms are not fully covered and especially during the monsoon passengers at Bandra end of the train are put to considerable inconvenience. The

distribution of other conveniences like lavatories, Booking Offices, stalls etc. leaves much to be desired. The Churchgate station building is out of tune with the other modern buildings which have come up in this area.

On account of the area surrounding Churchgate station having been built up, considerable difficulty is experienced. The proposed scheme for the remodelling of Churchgate station provides all the facilities within the limited area. The Churchgate station will be a modern building with a large concourse and a cover over the entire platform length with adequate facilities such as Booking Offices, Stalls, Urinals etc.

To enable these works to be executed, it will be necessary to dismantle the existing building and change the lay-out of the present yard. During the period of the construction, it will not be possible to receive and despatch trains from the existing Churchgate station. During this period, it is proposed to provide a temporary station about 2 furlongs from the Churchgate station towards Marine Lines station, more or less opposite the B.P.H.A. ground. The temporary station will be provided with 2 platforms, Booking Offices and other facilities.

The work is expected to take about 15 months and the temporary station will be continued during this period.

When remodelling Churchgate station, this opportunity is being taken to provide extra accommodation for the Headquarters Office of this Railway. During the War and thereafter, attempts have been made to provide extra accommodation for the Headquarters Office by utilising verandahs, constructing extra wings to the maximum possible extent but this has been inadequate to meet the possible requirements. A portion of the Office is now located in the Army and Navy Building opposite Jehangir Art Gallery and another two sections are proposed to be located in a building near the Crawford Market. The distribution of offices in various centres, apart from being unsatisfactory from the point of view of efficiency, is also causing inconvenience to the public. With the large scale expansion of Railway activities under the Second Five Year Plan, it will be necessary to find extra accommodation for the staff required to plan the expansion and to work the increased commitments. No land is available near the Headquarters Office at Churchgate for expansion. Office accommodation will be provided over the concourse hall which, apart from providing the necessary space opposite to existing offices, would lead to the utilisation of valuable space in the interests of economy and provide for the public who have to deal with the Headquarters Office of Western Railway more convenient and efficient service. This will also result in a structure coming up at this site in keeping with the buildings in the neighbourhood.

The cost of the provision of additional lines and platforms is estimated about Rs. 61 lakhs and the office building about Rs. 50 lakhs.

*** *** ***

CHITTARANJAN'S 300TH LOCOMOTIVE PRODUCED

Chittaranjan's 300th locomotive has rolled off the assembly lines.

In February this year Chittaranjan Locomotive Works completed the 200th locomotive, and the event was marked by the President, Dr. Rajendra Prasad, inaugurating the 200th engine.

The Chittaranjan Locomotive Works were originally planned to turn out 120 locomotives per year. This target has already been exceeded. The output has increased rapidly from six locomotives per month in the early part of 1954 to ten per month from January to June 1955. Thereafter, a monthly production of eleven locomotives has been maintained.

The Railway Board have accepted in principle to raise the annual target of production to 200 locomotives per year.

*** *** ***

THIRD CLASS TOURIST RAIL COACHES

In reply to a question by Shri Radha Raman, Shri Shah Nawaz han, Parliamentary Secretary to the Railway Minister, said that two broad gauge tourist rail coaches were being manufactured exclusively for Third class passengers to be used on the Western Railway, and these were expected to be ready by March 31, 1956.

Describing the special features of these coaches' he said that accommodation had been provided for 38 passengers, with a large floor area for the convenience of parties making use of these cars.

A separate compartment for ladies and children had been provided in the centre of the coach with a separate bath and lavatory. Two lavatories and one bathroom, were provided at a each end of the coach for general use, making a total of four lavatories and two bathrooms, excluding those provided for ladies and children.

A kitchen and a pantry had also been provided, fitted with a stove, table, sink, and a wash-up board to enable the parties to do their own cooking.

EXPRESS GOODS SERVICE PROVING POPULAR—EXTENSION SCHEME BEING CONSIDERED

The Railway Board is considering an extension of the popular Express Goods Train Service introduced some time ago on an experimental basis.

The Service, running to published time-table like passenger trains, has proved attractive to the commercial community because, compared to ordinary goods trains, its running time has been reduced practically by 50 per cent.

For instance, the Western Arrow Express Goods Train running between New Delhi and Bombay (Bandra), is now scheduled to cover the distance in just 60 hours and 50 minutes—a striking improvement on the position prevailing before the experiment was launched.

20 Trains Daily

This experiment resembles practices followed on the more advanced French and German Railways. Originally introduced as Weekly Express Trains, the popularity of this experiment quickly enabled the Railway Board to issue instructions for their conversion into daily services with effect from June last. At present, there are 32 Express Goods Trains—24 on the broad gauge system and eight on the metre gauge system. Twenty of these are daily services, the remainder running weekly, bi-weekly or at more frequent intervals.

There are several "trunk" Express Trains, linking important centres on different Railways. The "local" Express Trains run between points on the same Railway.

The Express Trains generally run "through" from the starting to the terminating stations, stopping only at a few selected intermediate stations for watering, refuelling etc. To take advantage of these stops traffic is booked at these stations and traffic coming in from the branch lines is also cleared onwards from there.

'First come, First served'

The Railways have instructions not to delay train departures merely on the ground that full train load are not forthcoming by departure time. If, however, more goods are offered than an Express Train can carry, a schedule of priorities operates. Within each priority category, traffic is cleared on the 'First come, first served' basis.

The Express Service helps both the Railways and the commercial community. It helps in the quicker turn-round of wagons and enables the consignors and consignees of goods to move their wares from place to place faster.

* * *

PROVISION OF ADDITIONAL STATIONS ON THE SINGLE AND DOUBLE LINES

To assist in the quicker movement of growing traffic with safety, the Central Railway is engaged at the moment with the work of providing additional stations between long block sections on the Single and Double lines.

On 17th October, 1955 Iradatganj Station on the Jubbulpore-Allahabad Section was opened with standard III interlocking arrangements for unrestricted speed over the main line in welcome contrast to the 30 miles per hour speed restriction that was in force with the station interlocked to standard I, before the date noted above. This work has been done at a cost of one lakh.

On the Igatpuri-Bhusaval section, a new block station at an estimated cost of almost Rs. 45,000 was created at Rapli on 28th October, 1955 splitting up the long block between Summit and Manmad so as to increase capacity on this heavily worked main line Section. This will help in the carriage of additional goods traffic which has already started flowing.

Malkajgiri is another block station opened on the Secunderabad Suburban Section on 28th October, 1955 at an estimated cost of Rs. 26,660. This will help to clear a bottleneck on this busy section.

The work connected with the provision of these additional block stations has been executed expeditiously after careful planning. The work of planning and execution of improved signalling and interlocking is going on increasingly in respect of many more stations, so as to give our passengers greater speed with safety and to provide more line capacity so as to help in the running of more trains to meet the growing needs of this country.

INCREASED BOILER EFFICIENCY

By W. G. W. Reid, M. I. Loco. E.

THE continued steady rise in the cost of fuel, the heavy capital charge of replacement of locomotive power demands high boiler efficiency and minimum lay off time during operation.

Various methods are used to conserve coal, by lowering the amount used, per lb. of steam generated, but complication in the operation of the locomotive due to some of the devices used may lead to increase in the time it is laid off for repairs and although these may be an intrinsic saving in fuel, the value of such savings may be lost in the inability of the locomotive to earn revenue because of its non-availability.

It is essential that no auxiliary to the main engine should be the cause of putting a locomotive out of service. Such maintenance which every auxiliary must periodically be given should be undertaken only when it is imperative to lay the engine off for essential servicing. Intermittent stoppage due to the failure of any auxiliary must be avoided if its value is not to be swamped in the failure of the locomotive to be available for service when required.

The steam locomotive is a means of converting the latent energy of the fuel into useful work but before this heat energy can be utilised it must be released through the process of combustion, and then transferred through the boiler plates and flues to the water where it appears in the form of steam.

Anything which will facilitate the transfer of heat adds to the efficiency of the process.

The Nicholson Thermic Syphon materially adds to the firebox heating surface and being in the direct path of the firebox gases absorbs heat not only by direct radiation but also by convection, the efficiency of heat absorption being materially assisted by the rapid circulation of the water through the Syphon.

The improvement in heat transfer, since the Syphon is an integral part of the firebox from the commencement of its life, is effective from the time the locomotive is first fired until it is withdrawn from service. This increased heat transfer means:

Increased (Performance) Efficiency

Increased Capacity

Fuel Economy

Lower Maintenance Costs

Further the Syphon is used to support the brick arch, either by itself or in conjunction with arch tubes, and in the event of a low water failure serves to prevent extensive damage to the roof sheet. The question of maintenance as an auxiliary can be dismissed as a factor liable to cause the locomotive to be laid off for out of course repairs, as it is an integral part of the firebox and needs no attention which is not given to the firebox of a locomotive in ordinary service.

Any saving of fuel by the use of Nicholson Thermic Syphons can therefore be considered as an actual saving in overall operation since the factors which may have a serious effect on operating availability do not play any part once the Syphon is installed. No demands are placed upon the engine crew to pay special attention to the Syphon whilst any locomotive so fitted is in operation and beyond routine inspection given at the same time as the firebox is normally inspected by the shed staff, there is no extra work involved in its maintenance.

Lower Boiler Maintenance costs and longer life of flues and fireboxes are additional important results of effective circulation.

It has long been common knowledge that the principles of the amount of heating surface and rapid circulation are fundamental when considering the efficiency of steam boilers, so it is accepted that the greater degree to which a uniform temperature can be kept throughout the boiler (thereby minimizing the stresses set up by lack of uniformity) so will general boiler maintenance costs be reduced.

On the Locomotive Testing Plant owned by the University of Illinois, two Illinois Central locomotives alike in all respects, except that one was fitted with a Nicholson Thermic Syphon, were placed on test. The results of these tests indicated that the Syphon fitted boiler was more efficient at all firing rates varying

between 30 lb. and 90 lb. per sq. ft. of grate area per hour. Further tests carried out on the Nashville, Chattanooga and St. Louis Railway with freight service locomotive showed an economy of fuel with engines fitted with Nicholson Thermic Syphons of 11.52% per 1000 gross ton miles and on the basis of fuel per drawbar Horse Power as 8.57.

A large number of fireboxes in modern locomotives are made of steel, the welding method of fabrication being favoured when steel is employed. The construction of the Nicholson Thermic Syphon ensures that there is no loss of strength in the construction of the firebox as a whole as the special methods of manufacturers enables the same factor of safety to be employed.

Firebox heating surface is the main factor (in considering the combustion efficiency as a whole) which determines the heat absorption by the boiler water. The evaporative power per unit of area of the firebox is considerably more than that of the flues and tubes and since the thermic syphon is located in the firebox, the increase in heating surface is located in a position where any increase is producing the maximum efficiency.

Further the design of the Syphon itself increases the rate of water circulation enabling the boiler to deliver a heavier weight of steam, in effect more boiler horsepower is available than with engines not so equipped.

The use of Nicholson Thermic Syphons is extensive in the United States and over one hundred Railways in various other parts of the world are operating more than 7000 locomotives fitted with Nicholson Thermic Syphons. The world total usage in 1947 according to the Locomotive Firebox Company of America was 30,000 in nearly 13,000 locomotives, spread over 200 Railways. Since then many hundreds of additional locomotives have been equipped.

Editorial Notice

The Editor invites contributions to the Magazine on a variety of topics—short stories, technical features written in simple English understandable to the laymen, Aspects of Railway Working, places of tourist interest, News from home line, activities on Railway Institutes etc. All copy should be brief and typed as far as possible.

Photographs illustrating social functions, sports events, scenic sports etc. are also invited. All contributions should reach the Editor not later than 5th of each month. Rejected Mss. will be returned provided sufficient stamps for postage are enclosed. No responsibility will be borne for copy lost in transit.

Views expressed in the Magazine should not be taken as having official authority.

All correspondence should be addressed to the Editor, "Southern Railways Magazine," Post Box No. 17, Tanjore, (South India).

Coaches—Third Luggage & Brake—Built in Kanchrapara Workshops

By A. C. Bhattacharya, A.M.I. Prod. E.

"THE history of civilisation is in fact, the story of transport." The national emblem of India, the '*Chakra*' or Wheel, truly signifies her greatest industry, the national railway which provide almost the whole inland transport of the peninsula. Concurrently with two hundred per cent increase in passenger traffic compared to what it was during the pre-war days, there has been a great demand for acquiring more rolling stock for the Indian Railways to meet the present day requirements.

In keeping with this demand, the Railway ˉoard drew out a comprehensive construction programme for building coaches in Railway Workshops and Kanchrapara Workshops on the Eastern Railway were called upon to build 125 Nos. Coaches for third luggage & Brake type which plays a very important role in the formation of passenger trains. In a train composition we usually have two of these coaches, one attached to its rear and the other to the front for being used alternatively in the 'Up' and 'Down' journeys aa the accommodation for the guard and the passengers' luggages in the compartments provided for the purpose. Thus it will be seen that to run increased number of passenger trains with a view to relieving traffic congestion, a Railway must have sufficient number of these coaches available in stock. It was primarily on this consideration that priority was given to tackle this construction programme in preference to others.

The Coach bodies are being built with the accommodation and floor plan arrangements. It will be seen that arrangements are in the nature of having two passenger compartments, two luggage vans; and a guards compartment at one end. The two passenger compartments have one swing door between them to maintain inter-communication. The seating arrangement in the passenger compartments is of transverse type with fixed upper berths supported by Stanchion racks and fixed on the roof by mild steel straps of $2'' \times \frac{1}{4}''$ section. In between the upper berth and the roof is located a light luggage rack.

The underframes on which these coaches are being built, are of IRS design of the built up type composed of high tensile steel section fitted with top operated hand brake. The Coach body structure is of strong timbered construction. The bodies have straight sides and are $9' - 11.3/16''$ over panels. The body exterior is of $3/32''$ thick mild Steel panel plates. For roof panelling, masonite tempered hard board of $\frac{1}{8}''$ thick has been used. The interior panelling of the guard and passenger compartments has been made with holoplast sheets or masonite tempered hard boards, depending on their availability, using wooden casing boards for the luggage vans.

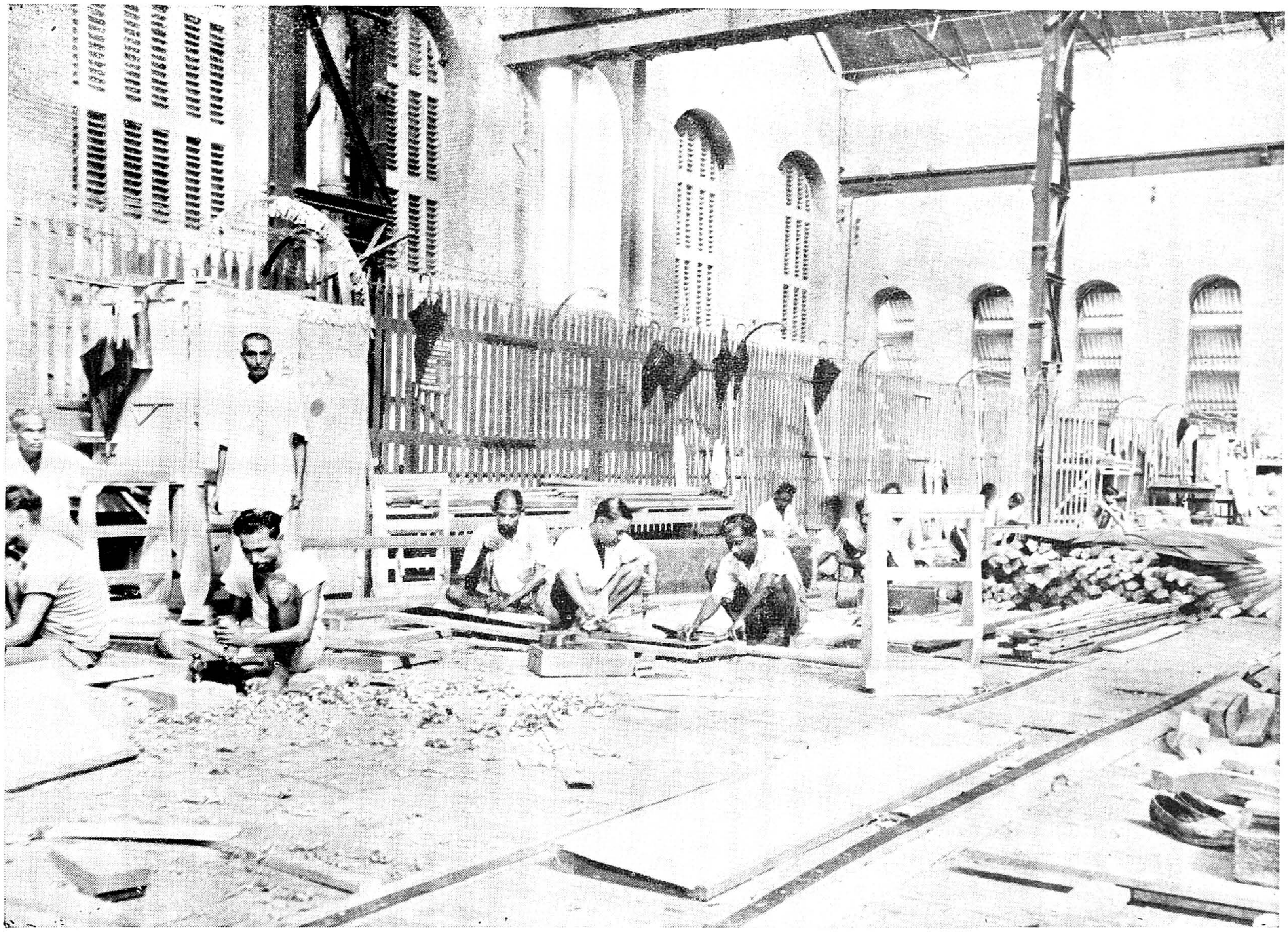
The floor of the guard and passenger compartments is made up of G. I. P. pattern wooden floor boards on which is laid the "Elephant Brand Red flooring Composition" to a thickness of $\frac{1}{2}''$ at the centre and $\frac{3}{8}''$ on the sides. The luggage compartment floor is finished with wooden battens fixed on floor boards. The roof carlines are of $1\frac{3}{4}'' \times \frac{1}{2}''$ mild steel flat section to take the roofing boards which, in turn, are covered by a layer of "Ruberoid" roofing two ply felt. This is made weather-proof by the application of hot roofing compound.

The seats in the passenger compartments are $23''$ wide with a minimum hip width of $19\frac{1}{2}''$ per passenger. They are arranged to provide a minimum knee room of $21''$. Resting on cast iron legs these are located at a height of $16''$ above the floor level. The seats and backs are designed to offer a comportable sitting posture. They are made up of timber frame with match boards laid on the seat frame and secured by means of nails, and backs boarded up with masonite hard boards fixed on the frame by screws. Dust-harbouring crevices have thus been avoided so as to discourage vermin infestation.

The luggage compartments have sliding doors and are equipped with luggage racks, shelves and bullion chest. The guard's compartment has two dog boxes located transversely. It is provided with a seat and table, light luggage rack, hand lamp bracket and pigion hole besides a commode, mirror and wash basin.

As different types of coaches are being produced simultaneously, the production techniques are those which would be expected in a Factory working on the "batch" type of order.

For the economical production, a number of components is manufactured on a sub-assembly mass production



General view of sub-assembly section.

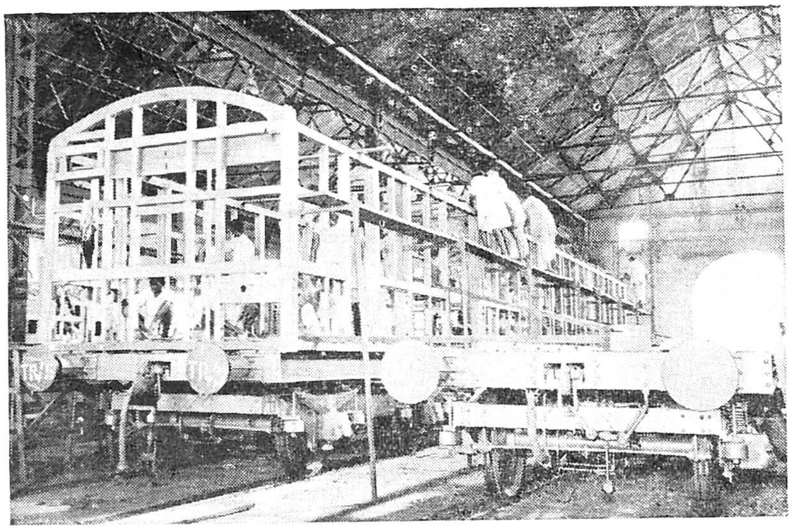
basis in the section created for the purpose. These sub-assemblies converge on the main shop where they are finally assembled to form the coach body.

The programme of work is carried out in the order mentioned below. To work to a schedule, rough time estimates, as indicated against the stages of work, have been calculated. It may be mentioned that these timings are not to be taken as the ideal.

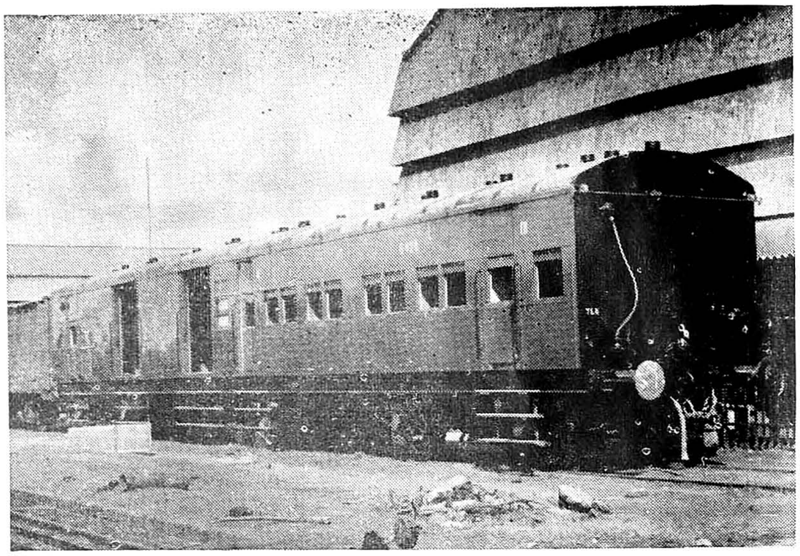
Programme of work	Man hours involved
I. Timber marking	356
II. Sub-assembly	1828
III. Cabinet & Bench section	1514
IV. Floor framing & laying of floor boards	770
V. Roof and tank fittings including other sundry fitments for body guard and luggage compartments	1500
VI. Assembly	6000
VII. Miscellaneous	532
VIII. Decoliting	288
IX. Pipe Work	472
X. Fitting of hand brake fittings	424
XI. Painting and final finish	1600
Total Man hours ..	15,284

TIMBER MARKINGS

To ensure that correct sizes of timber scantlings as required, are supplied by the Sawmill, a gang from the construction shop is posted to work for marking the scantlings. Timbers required for bottom sides, end bearers, cross bearers, longitudinals, pillars, waist rails, window head rails, cant rails, partition frames, seats, upper bunks, doors, foot-boards, latrine ceiling frame,



Skeleton Body of the Coach under construction.



A complete Coach (exterior view)

window frames, dog box partition and frames, sliding doors etc. are all marked by these men for the sawmill to cut them to the required sizes.

SUB-ASSEMBLY

The following items are manufactured in the Sub-Assembly section :—

(i) Seat partitions and seat flaps
(ii) Upper banks and their partitions
(iii) Sliding doors and pockets for sliding doors
(iv) Body side, partition and latrine doors
(v) Latrine ceiling frame

CABINET AND BENCH SECTION

This section deals with the manufacture of (a) window frames, (b) luggage racks, (c) Shelves, (d) Mirror frames, (e) dog box sliding doors, (f) dog box ventilation side frames, (g) lotah brackets and (h) battery boxes.

FLOOR FRAMING AND LAYING OF FLOOR BOARDS

In commencing to build the carriage body the bottom sides as received from the sawmill are the first timbers laid down. The bottom sides are mortised for the end bars and at correct intervals for the floor and intermediate bearers, as well as for all the pillars. The bearers having been planed, rebated and tenoned, are then fitted into place and well cramped up. To make the framing stronger, the internal angles formed by the connection are further secured by means of mild steel knees of size 6"x6"x1$\frac{1}{2}$"x5/8" firmly bolted on. Jointing paste is used in all joints and under all metal work. After this framing is completed, G. I. P. type floor boards are laid on and secured by means of 2$\frac{1}{4}$" No. 14 wood screws.

ROOF AND TANK FITTINGS INCLUDING OTHERS SUNDRY FITMENTS FOR BODY, GUARD AND LUGGAGE COMPARTMENTS

As it is essential to get the supply of roof carlines and tank suspension fittings before the work of body framing is taken in hand, the smithy and machine shops are entrusted with the responsibility of fabricating and supplying these fittings to body construction shop in time. Other body fittings including those required for the luggage compartments are also manufactured by these shops and supplied to the Construction Shop.

ASSEMBLY

From operation and onwards the body gradually gets into shape. The body framing along with the partition frame is built by fixing end rails, pillars, waist rails, window head rails, arch rails, cant rails, tank suspension fittings etc. in their respective positions as required and finally completed by fitting roof carlines to the cant rails.

After the carliners are fitted, the roof packings and roof boards are fixed and the timber portion of the work on the roof is completed having the ceiling boarded up with masonite tempered hard board sheets of 1/8" thick.

HOW TO RESERVE ACCOMMODATION

Unless you reserve your berth (I and II Class) or Seat (3rd Class long distance) in advance, you may not be sure of getting accommodation on the train you wish to travel by.

Application should be made to the Station Master of your starting station at least 3 days in advance specifying the date and train by which you intend travelling and the tickets must be bought in advance. The reservation fee leviable is 8 annas per seat or berth.

Reservation by I and II Class from intermediate stations by Express trains can also be made similarly, but reservation ticket can be issued only after getting an advice from the Reservation Centre that the reservation has been made.

Tickets will be issued only if accommodation is available.

If the reserved seats or berths are not occupied at least 5 minutes before the booked departure of the train the reservation will be cancelled and the seat or berth given away to another.

Reservation fee is not refundable.

III Class seats are also reservable on Express and certain other important trains for long distance passengers from the train-starting stations on payment of a reservation fee of four annas per seat.

Do not occupy a berth or seat reserved for another, as you are liable to be displaced at the last moment.

If you find another person occupying the berth or seat reserved for you and if he will not vacate it on demand, report it to the Guard or Station Master. They will help you.

(Inserted in the interests of Travelling Public by the Public Relations Officer, Southern Railways Magazine)

The men doing this work, then divide themselves into 4 groups to take over the following jobs :—

Group—1. Fixing and finishing of body side doors

Group—2. Inside panelling and furnishing

Group—3. Coach exterior work comprising the panel plating, fixing of mouldings, water strips and hand holds

Group—4. Work connected with latrine finishing

MISCELLANEOUS

The work done is in the nature of fitting alarm communication apparatus foot boards, completing other small details and finally attending to petty defects.

DECOLITING

The millwright shop then takes over the coach from the Construction Shop to treat the floor with the "Decolite"—a composition which is applied in a plastic condition and given a trowel finish.

PIPE WORK

The operations involved are :—

(i) Connecting the pipe connections in the lavatory, Guard's Compartment and inside the dog boxes from the roof tanks

(ii) Fitting Gravity lotah filler cocks

(iii) Fitting wash basins and push cocks in the lavatories and Guard's Compartment

(iv) Manufacturing and fitting water troughs in the dog boxes

FITTING OF HAND BRAKE FITTINGS

This is done by the underframe shop, the components are supplied loose by the Firm supplying the Underframe and they are fitted in these shops.

PAINTING AND FINAL FINISH

The stages of work that the coach has to undergo are :—

(i) Priming

(ii) Exterior cleaning and painting

(iii) Interior painting

(iv) Underframe painting

(v) Lettering

(vi) Final touch up and trimming

The finish of the exterior is carried out in synthetic paint enamel gulf red to B. S. C. 73 with ends and roof painted black.

The colour scheme adopted conforms to the Indian Railway standard practice and is as follows :—

(i) Exterior upto cant rail—Gulf red to B. S. C. 73

(ii) Ends— Black

(iii) Roof— Unpainted

(iv) *Lettering :—*

(a) Body— Imitation Gold to B. S. C. 56

(b) Underframe— White

(v) Inside— Dark brown paint to B. S. C. 12 to match the holoplast where used, otherwise seat and upper bunks grass green to B. S. C. 18, walls sea green to B. S. C. 17 and window frames Dark Brown paint to B. S. C. 12

(vi) Ceiling— White matt finish

(vii) Lavatory fittings and pipe connection Aluminium

(viii) Underframe :—

(a) Under gear— Black Bitumen

(b) Solebar — Black special

To speed up work, the train lighting section of the Electrical Depart : work side by side so that their portion of work can run concurrently along with the work of the Mechanical Department.

Important features and principal dimensions of the Coach are given below :—

1.	Length of body over panels	68′–0″
2.	Width of body over panels	9′–11.3/16″
3.	Floor area (inside)	617.55 Sq. ft.
4.	No. of Compartments	2 excluding 2 lugg : and 1 brake
5.	No. of Lavatories	2
6.	Area of Lavatory	14.88 Sq. ft.
7.	Passengers per compartment	19
8.	Floor area per passenger	8.51 Sq. ft.
9.	Centre of journals	7′–4″
10.	Size of journal	10″ x 5″
11.	Dia. of wheels en tread	3′–7″
12.	Bogie wheel base	10′–0″
13.	Centres of bogies	48′–0″
14.	Min. lighting per sq. ft. at 33″ above floor level	1.5 foot candles
15.	Total No. of fans provided	4 excluding 1 in the Guard's compartment
16.	Total No. of Mirrors.	2 do. do.
17.	Weight of underframe	22.28 tons
18.	Weight of body	16.15 tons
19.	Tare of equipped coach	Tons Cwts. 41 1 Qrs. Lbs. 0 0

ACKNOWLEDGEMENT

The author is indebted to Mr. R. Subbiah, Dy. Chief Mechanical Engineer, Eastern Railway Workshops, Kanchrapara for his interest and encouragement in producing this paper and to Mr. K. Ramachandran, Chief Mechanical Engineer, of Eastern Railway for his permission to publish it and reproduce the photographs received from the Public Relations Officer, Calcutta Railways.

(By courtesy The Indian Railway Engineer, Bombay)

ALUMINIUM PLANT AT HIRAKUD

INDO-CANADIAN VENTURE

The terms of agreement for setting up an aluminium factory at Hirakud with an annual production capacity of 10,000 tons have now been finalised and work is expected to commence shortly for its erection at Hirakud. The Indian Aluminium Company is a joint Indian and Canadian enterprise. Its representatives, Mr. A. E. S. Greenwood and Mr. Maheshchandra, met the Orissa Government at a conference presided over by the Chief Minister, Mr. Nabakrushna Chaudhuri and attended by the Orissa Industries Minister, Mr. K. G. Deobhanj and Government officials.

Under the proposed agreement which is expected to be signed shortly, Orissa is to supply 20,000 kilowatts from Hirakud to the 10,000-ton smelter. The ultimate production capacity of the factory will be 20,000 tons. It is understood that the company asked for 5,000 kilowatts more for having aluminium sheet rolling machine also. It asked for lands required for the factory (about 200 acres) to be made over to them immediately, so that construction of works might start by the middle of this month. It will have a capital investment of about seven and half crores rupees.

IN YOUR OWN INTERESTS

HOW TO PURCHASE TICKETS

Buy your tickets only at the proper place. The authorised offices are (i) the Booking offices at the railway stations, (ii) the Town or City Booking Offices, (iii) the out-Agencies, (iv) Travel Agents. Never buy tickets from any other source as that may lead you to trouble. Please note that tickets are not transferable.

Buy your tickets in the proper time. You can avoid unnecessary excitement and trouble if you come to the station in good time, that is at least half an hour before the scheduled departure of your train. The Time Tables of the Railway are on sale at Booking Offices and Bookstalls.

Buy your tickets in the proper manner. Queue up at the Booking Window and you can get your ticket easier and quicker than by crowding at the counter.

By handing in the *exact fare in good coins or currency* you get the ticket easier and quicker, and save for yourself and the Booking Clerk time and trouble.

Check up your ticket and money before leaving the counter and draw the attention of the Booking Clerk to any discrepancy you may notice.

(Inserted in the interests of Travelling Public)

The Great Mahamakham Festival at Kumbakonam

MAHAMAKHAM—BATHING DAY—25-2-1956

The Mahamakham festival at Kumbakonam (194 miles from Madras Egmore on the Madras-Dhanushkodi Main line) corresponds to the Kumbha Mela of North India and the Pushkaram festivals of the Andhra Desa. The celebrated Mahamakham festival occurs once in twelve years on the full-moon day in the month of Magha which synchronises with the English months of February-March, when the planet *Brihaspati* (Jupiter) passes the Zodiacal sign of *Simha* (Leo). It is the sincere belief of devout Hindus that the nine sacred rivers of India meet in the Mahamakham tank at Kumbakonam on the Mahamakham day which this year falls on February 25. The nine rivers are the Ganges, the Jumna, the Saraswathi, the Narmada, the Godavari, the Cauvery, the Mahanadi, the Payoshni (Palar) and the Sarayu. Thus, the sacred Ganges goes south, it is said, intermingling with eight other holy rivers in the waters of the Mahamakham tank, which becomes in consequence a centre of spiritual energy. So it is that people travel to Kumbakonam from all parts of India and have a holy bath in the tank on the Mahamakham day. Just before the festival, the tank is emptied until the depth of water is reduced to about 2½ feet, a precaution very necessary as thousands of persons enter the tank. The tank covers about 20 acres in extent and is one of the prettiest in South India.

CLEANLINESS LEADS TO HEALTH AND HAPPINESS

Clean orderly habits contribute to general health and welfare and as such to happiness and prosperity; they are more important than medicines.

Cleanliness prevents disease; medicine only attempts to cure.

Cleanliness of the person, of the houses and colonies, reflects discipline in the individual and the community. Discipline is the foundation stone for progress of oneself and the country. Cleanliness is a good habit. It is also cheap.

All Railwaymen should set an example of cleanliness. This will help others and themselves.

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